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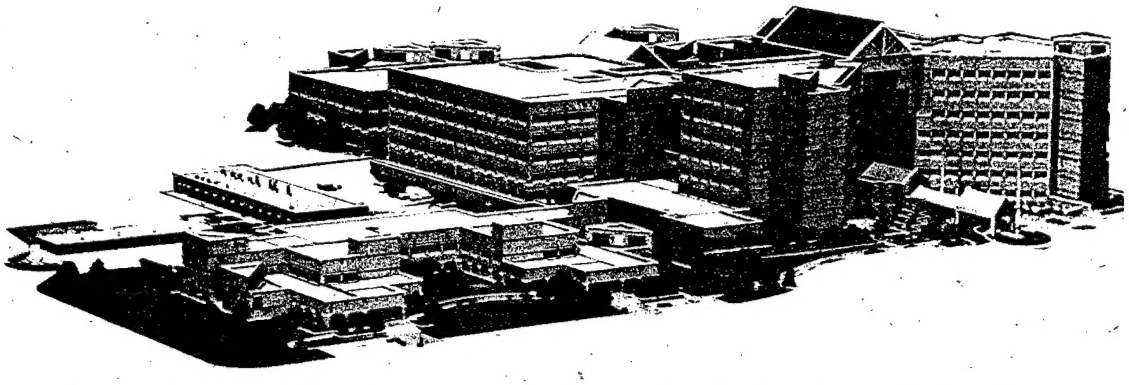
Special Medical Emergency Evacuation Device Platform

SSG Eric M. Smeed USA; SGT William D. Van Putte USA;

Guy A. Drew; LTC Leopoldo Cancio USA, MC

October, 2002



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The US Army Institute of Surgical Research (USAISR) has developed a Special Medical Emergency Evacuation Device (SMEED) platform (US patent pending), designed to secure commercial, off-the-shelf monitors, infusion punps, ventilators, and similar equipment to the standard NATO litter. This system fits the most commonly used euqipment in the US military inventory, and is easily customized to fit other devices. The need for such a system was evident during a mass-casualty training exercise for burns conducted by the USAISR Special Medical Augmentation Response Team (SMART Team) aboard a C 17 USAF aircraft in March 2000: there is no quick and efficient way to secure vital equipment to litters. The following requirements were established for such a product: rugged, lightweight, inexpensive, compatible with current and future commercial devices; customizable to meet individual customer and patient needs and aproved for in-flight use aboard military aircraft. ISR designed the first prototype platform and directed its fabrication at the Air Force Research Laboratory machine shop at Brooks AFB, TX. The SMART Team rigorously tested it aboard a broad range of vehicles during field training exercises at the Soldier-Medic Training Site, Camp Bullis, TX; Ft. Hood, TX; and the Florida Ranger Camp. The platform under went further revision at the USAISR and has been transitioned to advanced product development by the US Army Medical Materiel Development Agency (USAMMDA). The new version (Model IV SMEED) has successfully undergone USAF AFMED testing. The SMEED passed all of the tests successfully and was approved for use during all phases of flight on all USAF Aircraft.

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REPLY TO
ATTENTION OF

MRMC-USM (70-1y) 15 Oct 2002

MEMORANDUM FOR COMMANDER

SUBJECT: Information Copy of Manuscript

1. The manuscript entitled "Special Medical Emergency Evacuation Device Platform (SMEED)" by Eric Smeed, William VanPutte Guy Drew Lee Cancio has been reviewed by this Command and meets acceptable standards for publication as an ISR Technical Report. The manuscript contains no matter that warrants disapproval for security or policy reasons.

2. The above manuscript has been submitted to the DTIC to be considered for publication.

JOHN B. HOLCOMB
COL, MC
Commanding

Enclosure

CF:
Cdr, MRMC, ATTN: RMI-S
Eric Smeed

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REPLY TO
ATTENTION OF

MEMORANDUM FOR THE DIRECTOR OF RESEARCH 7 OCT 02

SUBJECT: Manuscript Review

1. I have reviewed the attached manuscript entitled SMEED Technical Report.

2. The manuscript meets the requirements of good scientific merit.

3. I recommend the attached manuscript be approved for submission to DTIC as an ISR Technical Report.

L. Cancio MD
LTC MC US Army

RECOMMENDATION:

APPROVAL/DISAPPROVAL

DAVID T. ZOLOCK
COL, MS
Director of Research

Encl

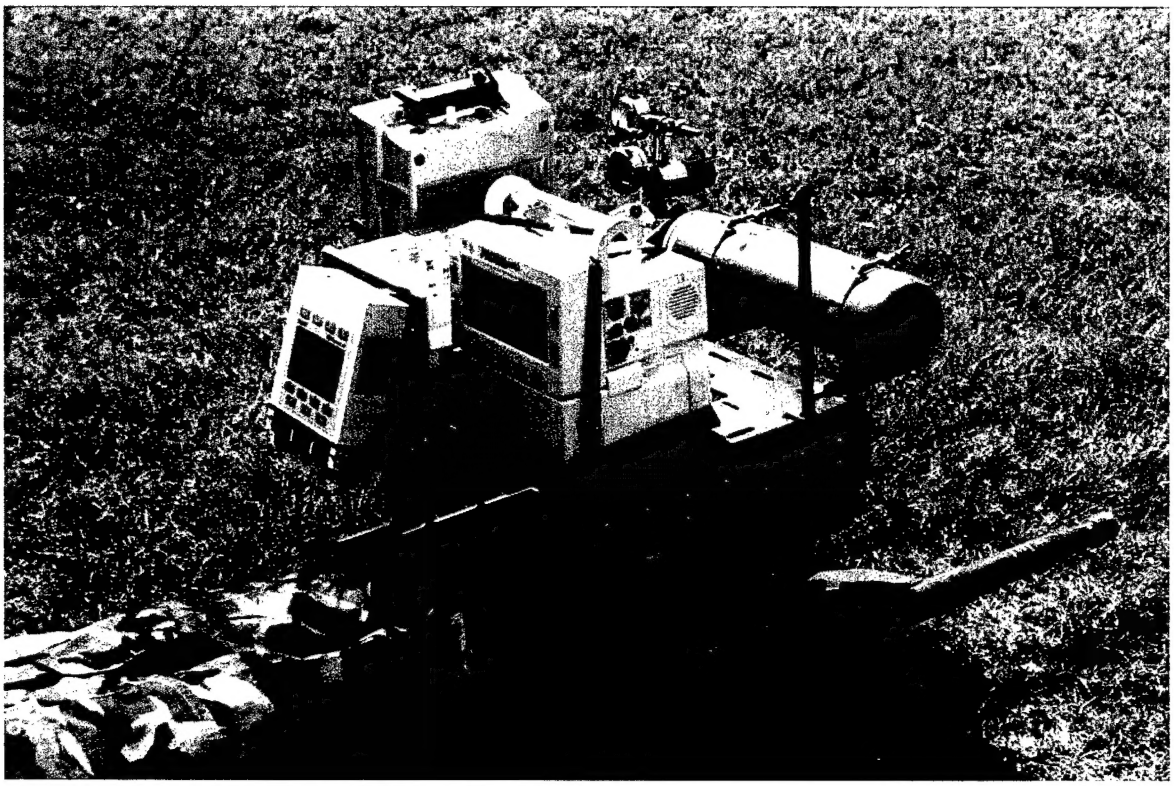
CF: Investigator (wo/encl)
Commander's Office (w/encl)
MRMC (w/ encl)
Regulatory Compliance and Quality (w/ encl)

Combat Casualty Care

United States Army Institute of Surgical Research

SPECIAL MEDICAL EMERGENCY EVACUATION DEVICE PLATFORM
Technical Report

By Eric M. Smeed, William D. VanPutte, Guy A. Drew, Leopoldo C. Cancio



LIFE SUPPORT FOR THE OBJECTIVE FORCE

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Special Medical Emergency Evacuation Device Platform:
Life Support for the Objective Force

United States Army Institute of Surgical Research
3400 Rawley E. Chambers Blvd.
Fort Sam Houston Texas, 78234

Table of Contents

Table Of Figures

NOTE: The opinions or assertions contained herein are the private views of the authors, and are not to be construed as representing the official viewpoint of the Department of the Army or of the Department of Defense. Mention of specific products does not constitute an endorsement.

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Special Medical Augmentation Response Team for Burns (SMART Team), United States Army Institute of Surgical Research, Fort Sam Houston, TX: officers and soldiers, for assistance with field-testing.

United States Army Medical Material Development Agency, Ft. Detrick, MD: Mr. Phil Gula, Mr. Don Caudwell, and Mr. Mark Brown for project management and fabrication expertise.

Air Force Research Laboratory, Medical Equipment Development Activity, Brooks AFB, Texas: TSgt Robert E. Eshelman and Mr. Victor Elizondo for aeromedical evaluation of SMEED platform.

United States Air Force, 311th Human Systems Wing, Brooks Air Force Base, San Antonio, Texas: Maj. Denise Augustine Capt. Paul T. Driessen, and 1Lt. Melissa Bookman-Small, MSgt. Ernesto Lozares, and Mr. Al Caballero for in-flight testing aboard USAF aircraft.

United States Air Force Medical Equipment Support Activity, Fort Detrick, MD: LTC James Sylvester and LTC Steve Bell for conducting military utility assessments onboard Civil Reserve Air Fleet aircraft and Seahawk exercise.

Texas Tool Inc., San Antonio, Texas: Mr. Steve Gayer and Mr. Larry Jackson for production of additional prototypes.

Cahn and Samuels Attorneys-at-Law: Washington, DC: George A. Metzenthin for preparing patent application for the SMEED platform.

Photo credits

Mr. Glen Gueller and Mr. Doug Gibson of the Audiovisual Support Branch, United States Army Institute of Surgical Research, Fort Sam Houston, Texas provided photographic support for this project.

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EXECUTIVE SUMMARY

INTRODUCTION

The US Army Institute of Surgical Research (ISR) has developed a Special Medical Emergency Evacuation Device (SMEED) platform (U.S. patent pending), designed to secure commercial, off-the-shelf monitors, infusion pumps, ventilators, and similar equipment to the standard NATO litter. This system fits the most commonly used equipment in the U.S. military inventory, and is easily customized to fit other devices. The purpose of this technical report is to describe the construction and operation of the SMEED platform.

REQUIREMENTS

The need for such a system was evident during a mass-casualty training exercise for burns conducted by the ISR Special Medical Augmentation Response Team (SMART Team) aboard a C17 USAF aircraft in March 2000: there is no quick and efficient way to secure vital equipment to litters. The following requirements were established for such a product: rugged; lightweight; inexpensive; compatible with current and future commercial devices; rapidly customizable to meet individual customer and patient needs; approved for in-flight use aboard military aircraft.

HISTORY

ISR designed the first prototype platform and directed its fabrication at the Air Force Research Laboratory machine shop at Brooks Air Force Base, TX. Then, the SMART Team rigorously tested it aboard a broad range of vehicles during field-training exercises at the Soldier-Medic Training Site, Camp Bullis, TX; Ft. Hood, TX; and the Florida Ranger Camp. These experiences resulted in an improved platform that was then tested and approved by Air Force Medical Equipment Development (AFMED) at Brooks Air Force Base. The total time between identification of the problem and flight approval of this product was 9 months. The total cost for prototype construction was $1900, and the cost for flight-testing was $2346. The hand-built production cost for each of 10 units was only $938. The 1st version of the platform was acquired for patient use during ISR SMART Team operations. ISR then sought to create a version of the platform with broad utility to the rest of the United States Military.

CURRENT STATUS

The platform under went further revision at the ISR, and has been transitioned to advanced product development by the US Army Medical Materiel Development Agency (USAMMDA). This technical report, unless otherwise stated, refers to the new version, or "Model IV SMEED". The new version has successfully undergone USAF AFMED testing, to include vibration tests to jet, turbo-prop, and helicopter characteristics. The SMEED passed all tests successfully and was approved for use during all phases of flight on all USAF aircraft (including fixed and rotary wing). Additional comments from AFMED: "The SMEED design offers maximum flexibility in securing medical equipment devices needed for patient care directly on the patient's litter. This improvement allows continuous patient monitoring, patient care and comfort, and may

reduce the need for an 'equipment litter'. The SMEED is an important advancement in aeromedical equipment securing technology by accommodating a variety of Patient Movement Items common to all military services". Further historical details appear below on page 9.

Technical Data and Capabilities

Technical Data

Composition: Aluminum sheet and stainless steel parts
Color: anodized flat black
Weight (empty): 20 lbs.
Dimensions:

Length: 14 inches
Width: 22 inches
Height: adjustable to three different levels above the patient with height measured at the top of the litter pole to the inside of the top plate

Low: 5 1/16"
Middle: 7 9/16"
Fully extended: 10 1/16"

Note: Overall height of the Platform in the fully extended position with full equipment load does not exceed the height of 21 ¼". Base of measurements are obtained from the top of the litter pole to the top edge of Propac Monitor.

Functional Capabilities

Mounts on the NATO litter at any location, head-to-toe (minus handles).
Accommodates any reasonable medical equipment load
Compatible with all USAF and US Army airframes, to include the UH60
Folds to a briefcase-like package

EXAMPLES OF EQUIPMENT SUCCESSFULLY TESTED ON THE SMEED TO DATE:

Uni-vent 754 ventilator, Impact instrumentation Inc., West Caldwell, New Jersey
Ultra-Lite326 Suction, Impact instrumentation Inc., West Caldwell, New Jersey
Percussionaire Military Transporter (TXP) ventilator, Percussionaire Inc., Sandpoint, Idaho
Protocol 206EL Monitor, Protocol System Inc., Beaverton, Oregon
Med System III Infusion pump, Alaris Medical Systems Inc., San Diego, California.
Steel oxygen cylinders (size "D")
Carbon-fiber oxygen cylinders (lite "E").
Lifepak 10 defibrillator, PhysioControl Inc., Redmond, Washington

DEVELOPMENT MILESTONES

March 2000

a. The need for a platform system was evident during a mass-casualty training exercise conducted by the ISR Special Medical Augmentation Response Team for burns (SMART Team) aboard a USAF C17 aircraft on 19 March 2000. LTC Leopoldo Cancio approached SSG Eric Smeed on that date, asking him to develop a platform capable of mounting SMART team equipment--to include ventilator, monitor, infusion pump, and related devices--to the NATO Litter.

b. SSG Smeed made contact with two fabrication shops and discussed proposals for a prototype:

   1. SSG Smeed contacted Whitmore Enterprises Inc. San Antonio, TX on 21 March 2000.
   2. SSG Smeed contacted the Brooks Air Force Base Research Laboratory (AFRL) machine shop, San Antonio, TX shortly thereafter.

April 2000

a. SSG Smeed produced a visual concept of the Model I SMEED Platform out of cardboard and balsa wood on 1-2 April 2001 and presented it to LTC Cancio on 3 April 2000.

b. Under LTC Cancio's direction, SSG Smeed coordinated fabrication of this prototype at the AFRL machine shop. The ISR did a Military Interdepartmental Purchase Request (MIPR) for $1500 to AFRL to start development.

May 2000

a. Funds were increased to AFRL to further development.

June 2000

a. The first Model I SMEED Platform was completed.

August 2000

a. The SMART Team conducted a training exercise at Camp Bullis with the Model I SMEED Platform.

b. SSG Smeed submitted the SMEED Platform to the US Army Idea for Excellence Program on 22 August 2000.

c. SSG Smeed supervised production of 10 units of the Model I SMEED Platform at AFRL for SMART Team use.

September 2000

a. SMART Team representatives presented the Model I SMEED Platform at the Advance Technology Applications in Combat Casualty Care Conference (ATACCC) at Fort Walton Beach, Florida.

October 2000

a. SSG Smeed started negotiation for technical testing of the Model I SMEED Platform with the United States Air Force Medical Equipment Development (AFMED) on 30 October 2000. The cost of testing was $2,346.

November 2000

a. The ISR transferred funds by MIPR ($2,346) to AFMED to start testing on 12 November 2000.

December 2000

a. AFMED issued a report on the Model I SMEED Platform, stating that it was approved for use during all phases of flight on all United States Air Force aircraft, fixed and rotary wing.
b. SSG Smeed presented the Model I SMEED Platform on 16 December 2000 at the Special Operations Medical Association Conference in Tampa, Florida.

February 2001

a. The Model II SMEED Platform was started. The goal for this interim version was to permit the attachment of a number of primary movement item (PMI) equipment. Thus, the platform would have wide utility throughout the U.S. military. The platform was constructed at Texas Tool Inc, San Antonio, TX. It was started on 5 February 2001 and completed on 28 February 2001.
b. SSG Smeed and LTC Cancio presented the Model II SMEED Platform to the Joint Medical Augmentation Unit, Joint Special Operations Command, Pope AFB, NC on 21 February 2000.

April 2001

a. The Model III SMEED Platform was constructed at Texas Tool Inc. on 25 April 2001 at a cost of $6200. This interim version incorporated rapid removal, relocation, and reattachment of a variety of medical devices. The platform also incorporated height adjustment.

May 2001

a. SSG Smeed presented the Model III SMEED Platform at the US Army Medical Research and Materiel Command (MRMC) 2001 Acquisition, Logistics, and Technology Conference on 24 May 2001.

June/July 2001

a. SSG Smeed traveled to the United States Army Medical Material Development Activity (USAMMDA), Fort Detrick, MD for advanced development of the SMEED Platform. This resulted in the start of a Model IV.

August 2001

a. USAMMDA forwarded $25,000 to the ISR for advanced development and testing of the SMEED Platform.

September 2001

a. SSG Smeed presented the SMEED Platform at the 2001 ATACCC conference on 13 September 2001.
b. SSG Smeed presented the SMEED Platform to United States Army Aeromedical Research Laboratory (USAARL), Fort Rucker, AL, and discussed flight-testing.
c. SSG Smeed discussed technical testing of the Model IV SMEED Platform with AFMED. The cost of testing was set at $3,000.
d. The Model IV SMEED Platform was completed at Texas Tool Inc. at a cost of $1620.16. This version incorporated feedback from AFMED personnel on the projected test plan. Texas Tool delivered the platform on 28 September 2001.

October 2001

a. SSG Smeed presented the Model IV SMEED Platform to the 311th Human System Wing, Brooks AFB, San Antonio, TX on 30 October 2001.

b. AFMED issued a report on the Model IV SMEED Platform on 16 October 2001, stating that it was approved for use during all phases of flight on all United States Air Force Aircraft, fixed and rotary wing.

November 2001

a. SSG Smeed and LTC Cancio presented the SMEED Platform to the United States Air Force Medical Equipment Support Activity (AFMESA), Fort Detrick, MD on 4 and 13 November 2001.
b. SSG Smeed and LTC Cancio presented the platform to the Directorate of Combat Doctrine Development (DCDD), Fort Sam Houston, TX on 26 October 2001.
c. SSG Smeed and LTC Cancio presented the platform to the Evacuation Integrated Concept Team, Fort Sam Houston, TX on 15 November 2001.
d. The SMEED Platform was placed on the Federal Register, Vol. 66 No. 213, Friday, November 2, 2001, Notice.

December 2001

a. SSG Smeed presented the SMEED Platform at the 2001 Special Operations Medical Association Conference on 9 December 2001.

January 2002

a. AFMESA started the Military Utility Assessment of the Model IV SMEED Platform during the Civil Reserve Air Fleet (CRAF) Exercise on 9-19 January 2002. CRAF is a program that enables the US Air Force to use civilian airline aircraft as aeromedical evacuation platforms in times of national emergency. SSG Smeed was present during the exercise as a subject matter expert on the platform. The CRAF exercise started at Greenville, TX and traveled to the following stops:
    1. Scott AFB, IL
    2. McChord AFB, WA
    3. Charleston, NC
    4. Travis AFB, CA
    5. Andrews AFB, VA
    6. Kelly AFB, TX
b. The US Coast Guard version of the SMEED Platform (Model CG-1) was constructed at Texas Tool Inc, San Antonio TX, on 16 January 2002. This version is modified to mount on the Stokes Litter and does not have height adjustment.

March 2002

a. SMEED Mark IV Received Safe to Fly Recommendation from Air Force (311 HSW/YA).
b. SGT VanPutte presented the SMEED Platform at the Sea-Air-Space Conference in Washington DC.
c. SGT VanPutte presented the SMEED Platform to the Whitehouse Medical Staff.

April 2002

a. SGT VanPutte presented the SMEED Platform to the US Marine Corps Warfighter Laboratory, Quantico VA
b. SGT VanPutte presented the SMEED Platform at the En-Route Care Conference at the Naval Health Research Center, Navel Submarine Base, San Diego, CA.
c. SGT VanPutte presented the SMEED Platform at the Critical Care Transport Medical Conference in Las Vegas, NV.

d. The SMEED Platform was used at a field exercise at Walter Reed. SSG Vietri was present during the exercise as a subject matter expert on the platform.

May 2002

a. SGT VanPutte presented the SMEED Platform at the Association of the United States Army Medical Symposium and Exhibition in San Antonio, TX.
b. SGT VanPutte presented the SMEED Platform at the Army Aviation Association of America Annual Convention in Nashville, TN
c. SGT VanPutte presented the SMEED Platform to the US Army School of Aviation Medicine at Fort Rucker, AL and left unit for evaluation at the school.
d. SGT VanPutte presented the SMEED Platform to USAARL for Air Worthiness Testing, Fort Rucker, AL

June 2002

a. SMEED Platform used by US Army Burn Flight Team to pickup burn patient from San Diego, CA

July 2002

a. SMEED Platform evaluated at the Joint Service Seahawk exercise. SGT VanPutte trained all personnel at the exercise on the uses of the SMEED platform and was present during the exercise as an evaluator and subject matter expert on the uses of the platform. The SMEED Platform was used on the following aircraft/vehicles during the exercise:
    1. C-130
    2. C-9
    3. C-17
    4. Ambulance Bus (AMBUS)
    5. Patient Platform
    6. Air force Ambulance
    7. Litter cart
b. SGT VanPutte presented the SMEED Platform to the US Special Operations Command Biomedical Initiatives Steering Committee at the Joint Special Operations Medical Training Center, Fort Bragg, NC
c. SGT VanPutte presented the SMEED Platform to the 75th Ranger Regiment's Medical Plans, Requirements and Standardization personnel, Fort Benning, GA and two platforms were left to be sent overseas for real world evaluation.

August 2002

a. SGT VanPutte presented the SMEED Platform to the 2/2 Battalion Landing Team / 24th Marine Expeditionary Unit, Camp Lejeune, NC and two platforms were left to be deployed overseas with the unit for real world evaluation.

September 2002

b. SGT VanPutte presented the SMEED Platform at the National Guard Association of the United States Conference in Long Beach, CA
c. SGT VanPutte presented the SMEED Platform at the Advanced Technology Applications for Combat Casualty Care Conference in St. Pete Beach, FL

OPERATIONAL INSTRUCTIONS

INTRODUCTION

The platform design allows the care provider maximum flexibility if deployed properly. Prior to operating the platform, it is imperative that the care provider takes the following points into consideration:

a. Potential evacuation vehicles
b. Number of patients
c. Equipment needed
d. Height of the platform and location on the litter
e. Line-of-sight of equipment

EQUIPMENT OVERVIEW

The platform is designed to carry all of the current Medical Primary Movement Items (PMI). The equipment is mounted by a variety of standard accessory clips that do not require any modification of the equipment. Each accessory clip has a standard design which allows it to mount on the platform in a variety of locations.

Equipment capable of mounting on the platform

We have successfully mounted all of the following equipment on the platform:

Top-mounted equipment:

a. Univent Impact Ultra-Lite326 Suction
b. Univent Impact 754 ventilator
c. Percussionaire Military Transporter (TXP) ventilator.
d. Protocol Encore 206EL monitor
e. Lifepack 10 defibrillator

Side-mounted equipment:

a. Univent Impact Ultra-Lite326 Suction
b. Univent Impact 754 ventilator
c. Med System III infusion pump
d. Steel and carbon-fiber oxygen cylinders
e. Intravenous Pole (IV Pole)

EVACUATION VEHICLES

The US Armed Forces has no single evacuation vehicle. The platform was designed to have a low height if necessary and a minimal side projection. If the platform is deployed properly, it improves the ability of the care provider to perform patient care. Below is a list of aircraft that have been tested with the SMEED and some guidance on using setting them up.

a. **C-17, C-9 & US Air Force Patient Platform** – The SMEED should be placed in the middle height position. Patients can be placed in all three tiers. When patients are placed on the top tier the crew may have to step onto something to look down on the patient.

b. **C-130H (floor load)** – Fifteen patients can be floor loaded onto the aircraft with the SMEEDs in any position, but no equipment can be loaded on the sides of the SMEEDs because the litters are tied together. If the side tiers are utilizes eighteen more patients could be loaded but that would leave no room for equipment to be secured to the floor of the aircraft.

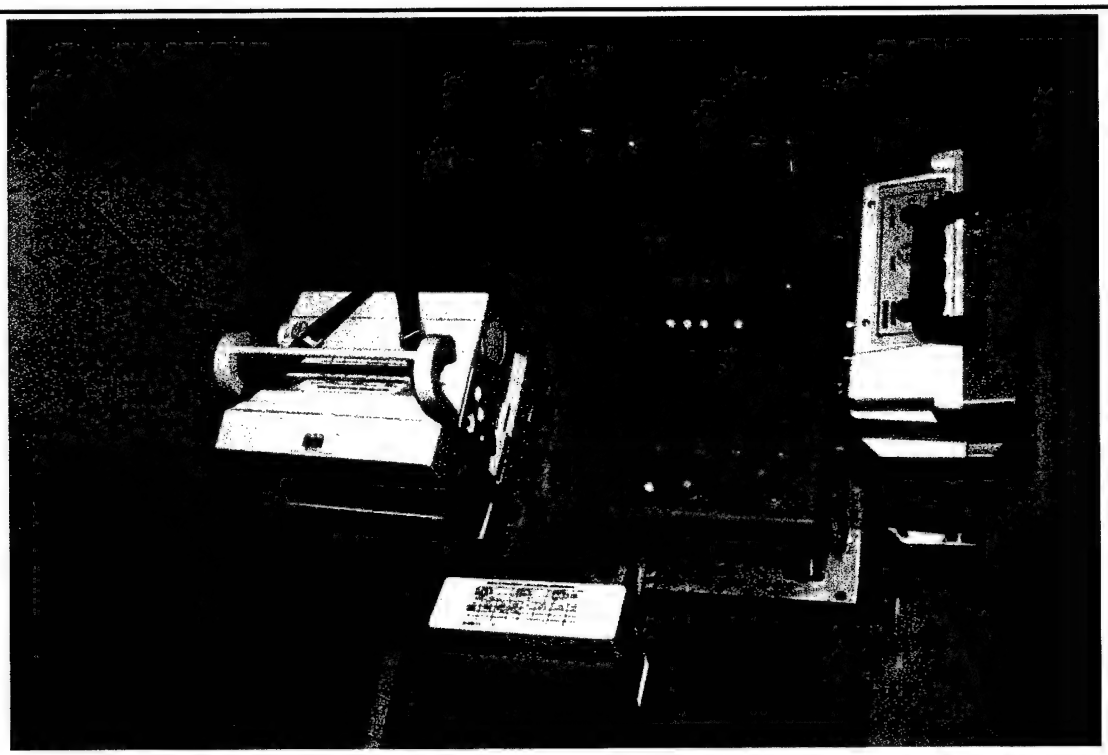
c. **C-130H (tier)** – The SMEED should be placed in the middle height position. The normal load for a C-130H is 74 patients (center sets of tiers 5 on each (5*10=50) side sets of tiers 4 each (4*6=24) total 74). When the SMEED is at the medium setting 58 patients can be on the tiers (center sets of tiers 4 on each (4*10=40) side sets of tiers 3 each (3*6=18) total 58), but the SMEEDs clear the top of the litter above with some room to spare. 48 patients can be loaded onto the C-130H with a large amount of room to spare (center sets of tiers 3 on each (3*10=30) side sets of tiers 3 each (3*6=18) total 48).

d. **Ambulance Bus (AMBUS)** – It was found that the platform could not be loaded onto the AMBUS in the highest or medium settings on the bottom tier, but it would fit in the lowest settings. Patients can be loaded on the top tier of the bus in the medium and lowest settings. The personnel loading the bus need to insure that there is no equipment mounted on ether side, but it can be loaded on the front (towage head of the patient) and rear (towage the feet of the patient). Insuring that the sides are clear for safety, this will allow for the free movement through the aisle. Equipment could be loaded on the side if there are only two patients with SMEED platforms attached and they are loaded last.

e. **Air Force Ambulance** – The platform should be in the medium setting when loaded into the ambulance in the left-lower tier, the SMEED needs to be in the lowest setting when put into the left-upper setting and right lower tier, while not fit into the right upper tier because of the AC unit.

f. **Litter cart** – A litter with the SMEED attached needs to insure that SMEED is push the maximum distance towards the rear rung on the litter to insure clearance of the securing clamps on the litter cart.

g. **General User Info** – Users need to insure that no equipment will be facing the outside of the aircraft or vehicles so they need to keep that in mind when they setup the SMEED.



HEIGHT AND EQUIPMENT CONFIGURATION ON THE PLATFORM

When configuring the SMEED the users need to take in consideration the vehicle being used for evacuation, and equipment to be mounted on the platform. The vehicle will affect the height that the platform can be placed at and the visibility of the equipment. The height of the platform and the variety of equipment used should be taken into consideration prior to placing the platform on the litter.

Height Setting

The platform height is determined by patient comfort, the vehicle used for evacuation and by the number of patients requiring evacuation. Individual equipment has its own height projection that will increase the overall height of the platform ensemble. This cumulative height projection from the individual equipment and the platform itself will directly relate to the available space between litter berths. In most cases the medium height setting is the recommended height setting.

> **Note:** The height of each piece of equipment must be considered with over all height of platform.

DEPLOYING THE PLATFORM

WARNING: Only properly trained personnel should operate the SMEED Platform; failure could result in injury to operators or patient. When securing any of the pushpins ensure that they are completely through and secured.

Securing Side Legs

The side leg should be secured using the following steps:

a. Remove the 1-inch Velcro Straps in order to release side legs (Figure 1).
b. Extend side legs and allow bracing to extend.
c. Anchor bracing by using positive locking pushpin (Figure 2).

Figure 1 Main Securing Velcro Straps

Figure 2 Anchoring Side Leg

Adjusting the height

The platform's height adjustment is accomplished by removing two positive locking pushpins located on the inside of each side leg.

a. Pins are removed by depressing the button on the pushpin, enabling the pin to be extracted.
b. Once pins are extracted, the operator moves the clamping assemble to one of the three desired positions.
c. The operator places the pin back by depressing the button and sliding the pin through to correlating holes (Figure 3-4).

Figure 3 Positive locking Push pins

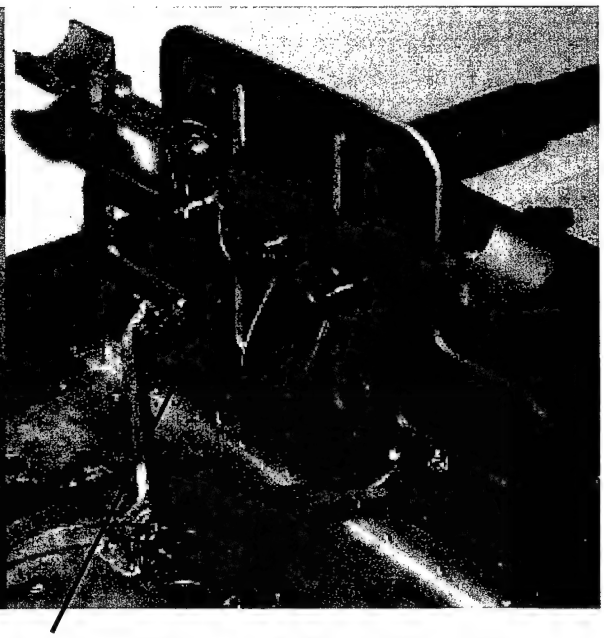


Figure 4 Platform in the middle height position

Notes:

- The platform height adjustment must be the same on both sides.
- The operator should not make any adjustment to the clamping tension mechanism after a height change.
- The operator is responsible for ensuring that the proper height of the platform is determined and adjusted prior to placing the platform on the litter.

Placing the platform on the NATO litter

Once height adjustments are complete, secure the platform on the litter by performing the following steps:

a. Lift platform and place it on the desired location of the litter (Figure 5).
Note: Platform can be placed anywhere on the litter with exception of the handles.

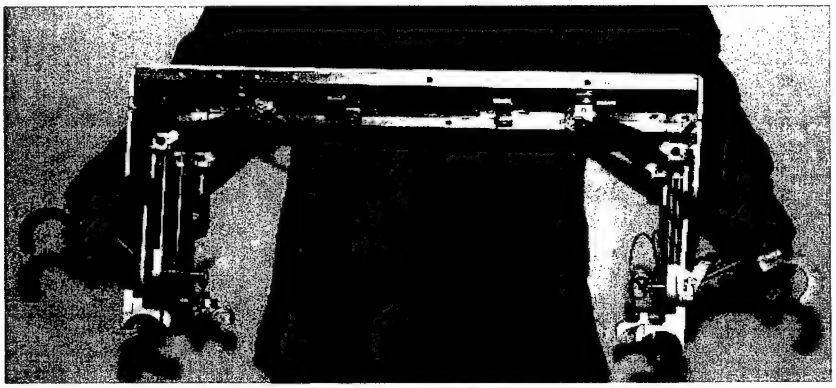


Figure 5 Placing SMEED on NATO litter

b. Allow swinging clamps to drop below the litter poles (Figure 6).

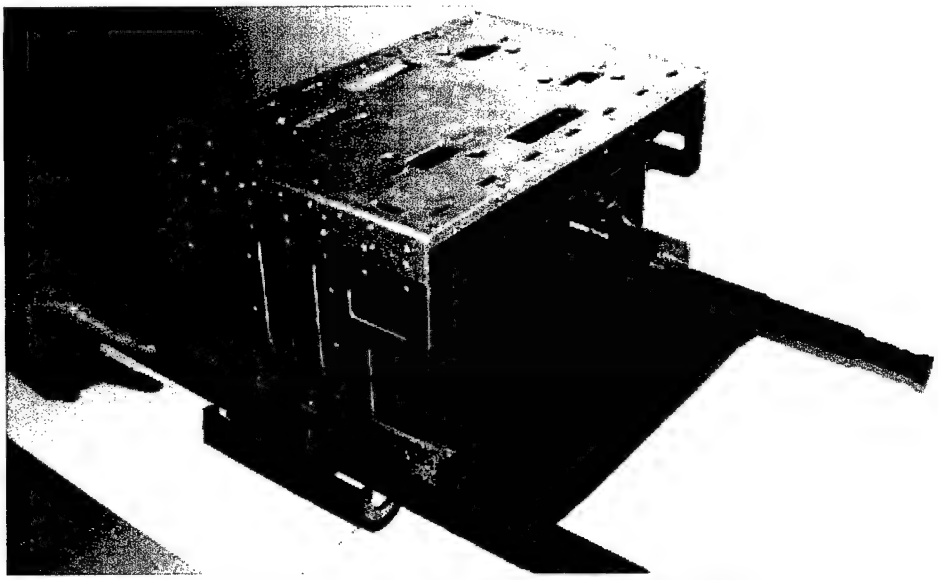


Figure 6 Securing SMEED to NATO Litter

c. Secure clamps to litter with an upward motion using the **palm** of the operator's hand (Figure 7).

Note: The operator uses the palm of his or her hand with an upward motion. **Do not use fingers as this may result in potential injury due to pinch points on the platform**.

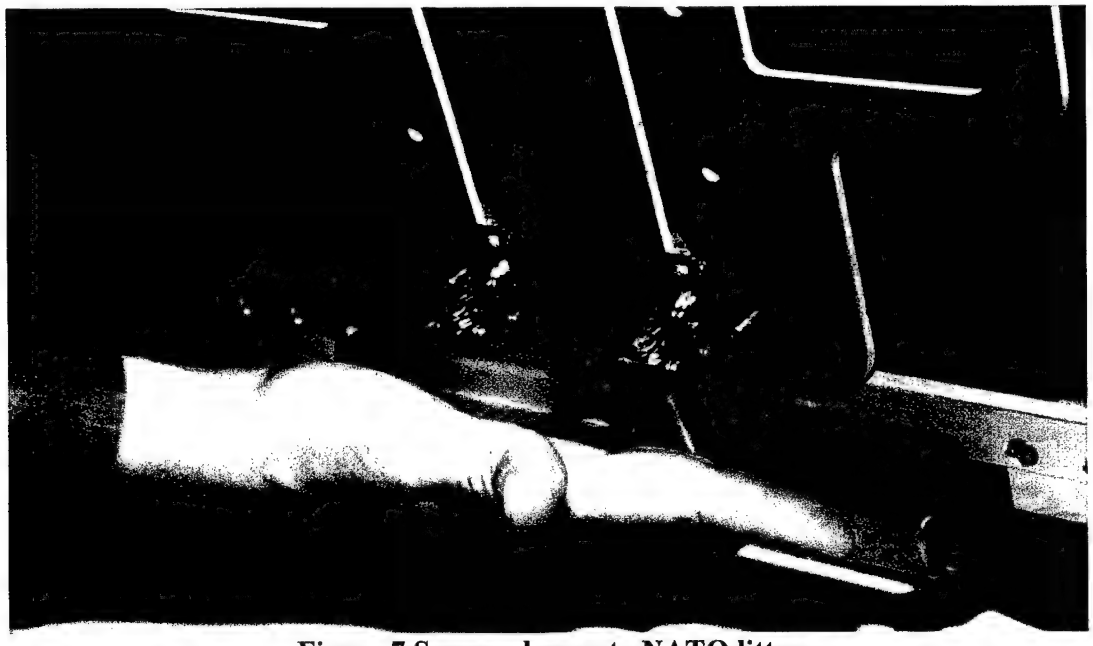


Figure 7 Secure clamps to NATO litter

d. Begin loading individual equipment accessory mounts in desired location,
    1. Secure the **side** mounting equipment first (Figure 8).
    2. Secure the **top** mounting equipment second (Figure 8).

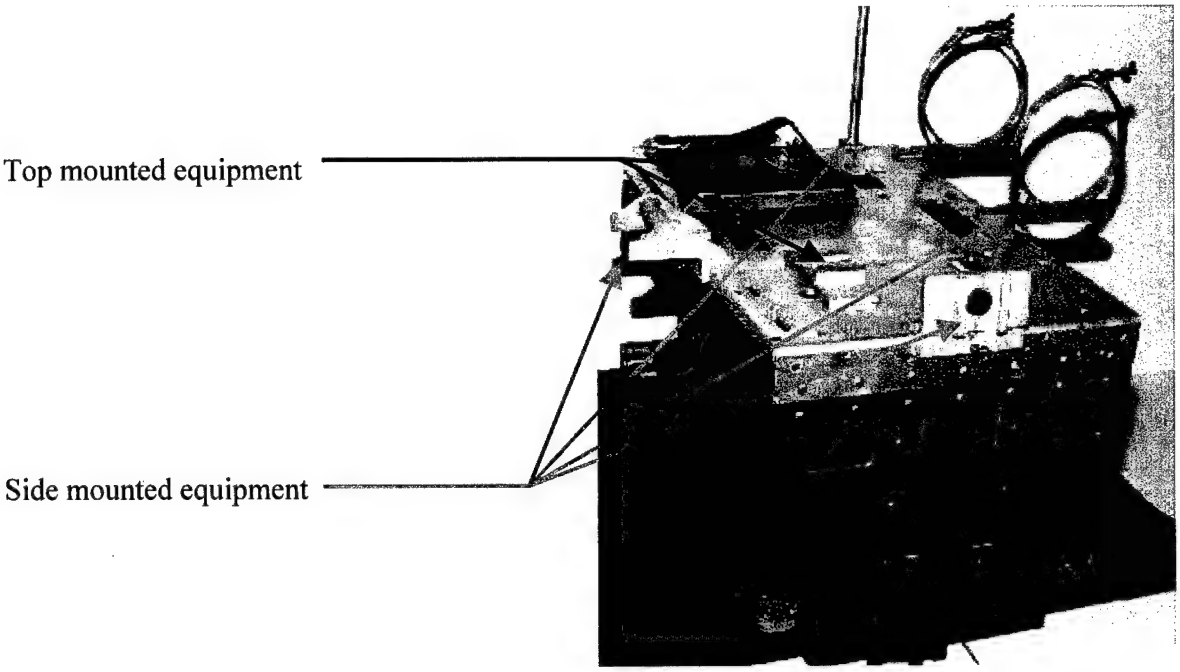


Figure 8 Top/Side Mounted Equipment

SECURING EQUIPMENT TO PLATFORM

Side-Mounted Equipment Instructions

The equipment accessory clips that are capable of mounting on the sides of the platform are capable of mounting on all 4 sides. The accessory mounts can mount in various positions along the entire length of each side. The equipment mounts all have a standard footprint, that allows for a variety of placement options (Figure 9). Each mount has a stubby-nose pull pin (spring-loaded) that allows for rapid application and removal. When applying the accessory clips the operator performs the following:

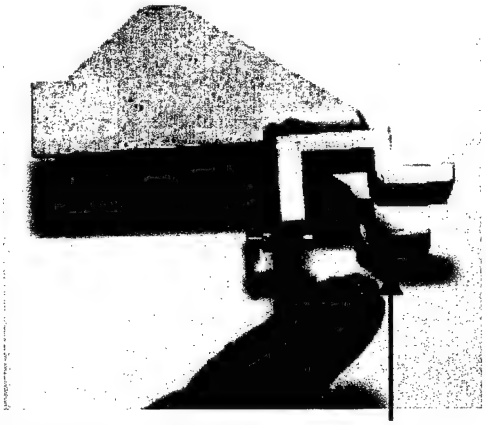


Figure 9 Standard bases for all side mounts

a. Line up the tabs of the accessory clip with the correlating tabs on the side of the platform (Figure 10).
b. Drop tabs through the main table.
c. Roll the clip downwards and away form the main table (Figure 11).

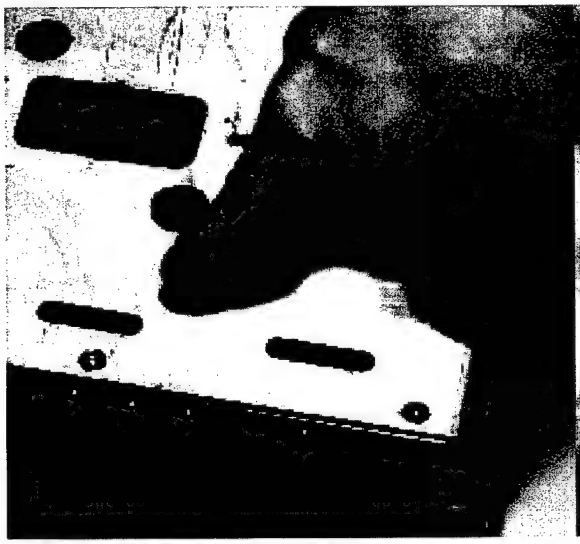


Figure 10 Side mounting accessory tabs

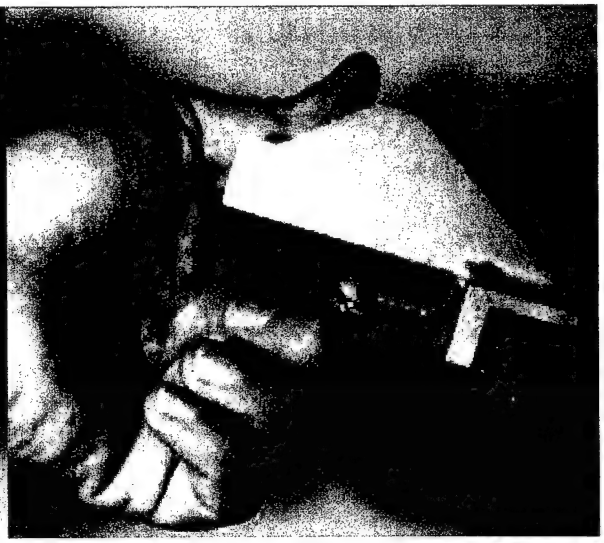


Figure 11 Mounting Side Accessory Clips

d. Secure by lining attached pushpin with hole in accessory clips and depressing the button and sliding the pin through to correlating holes allow it to seat in the corresponding hole.
e. Check clip to ensure that it is locked by shifting left, right, or up.

Note: When removing the mount, the operator depressing the button on the pushpin and rolls the mount in an up and out direction.

Med System III Infusion Pump Mount

This mount is capable of mounting on anywhere along the entire length of all 4 sides of the platform. The pump is mounted on the accessory mount by using the factory hardware attached to the pump. The operator seats the factory clamp on the pipe-shaped part of the infusion-pump mount. The pump should be facing away from the platform while mounting on the infusion-pump mount (Figure 12).

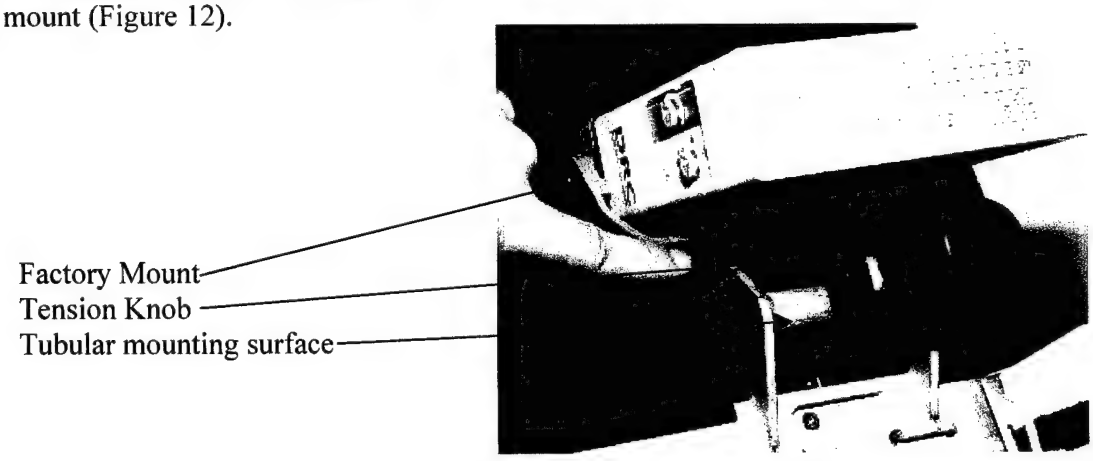


Figure 12 Med System III Infusion Pump Mount

Vertical Respirator Mount

The Univent Impact ventilator and suction equipment is mounted on either the top of the platform or side with the use of a Vertical Respirator Mount or a Female Bayonet Accessory Mount. The Impact ventilators and suction devices all have a standard male bayonet clip on the bottom half of the equipment. The mount used to attach the medical equipment to the main platform has a correlating grove that allows the bayonet clip to slide into (Figure 13).

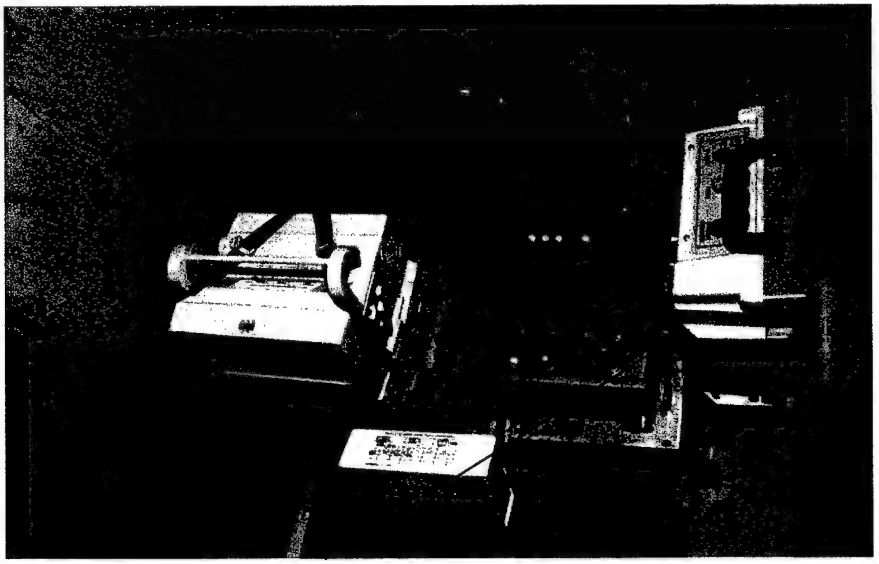


Figure 13 Vertical Respirator Mount

Note: When platform is fully loaded, the care provider has limited ability to apply appropriate torque on tension knob to vertical mounted respiratory mount.

The grove is tapered and is a one-way clip. This is to ensure the mount has a snug fit and reduces the risk of the equipment dislodging. Once the mount is seated, tighten the knob on the underside of the mount to a firm grip. It is optimal to mount either the ventilator or suction device on the platform prior to mounting anything next to it. This allows the operator the ability to tighten the tension knob without having a limited space due to an obstruction of surrounding equipment.

Note: It is optimal to mount suction equipment on the side of platform due to the suction canister.

IV Pole Mount

The IV Pole Mount is used to hang IV bag. It is secured to the main platform in the same manner as all the other side mounts mentioned above (Figure 14).

Figure 14 IV Pole Mount

Oxygen Cylinder Mounts

These are secured to the main platform in the same manner as all the other side mounts mentioned. Once accessory clips are secured on the main table, place the oxygen cylinder through both rings. The operator must ensure the oxygen cylinder bottle weight is evenly distributed between both cylinder clamps. Once seated, tighten both wing nuts evenly to ensure a tight fit (Figure 15).

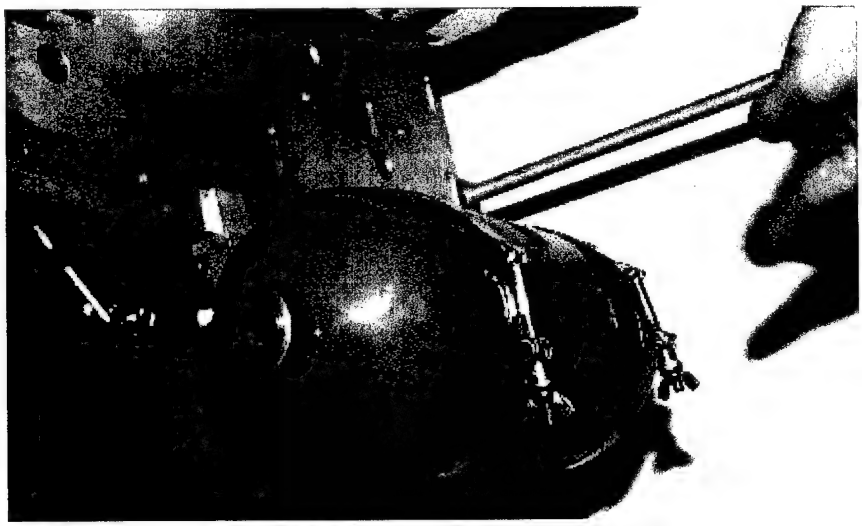


Figure 15 Oxygen Cylinder Mounts

Note: All medical equipment should be mounted prior to mounting the Oxygen Cylinder Mounts.

TOP-MOUNTED EQUIPMENT INSTRUCTIONS

Equipment mounted on the top of the platform mounts in 4 different locations. The locations are noted by the 4 distinct patterns on the 4 corners of the main platform. The mounts are capable of securing in either direction to allow for universal application (Figure 16).

Figure 16 Top-Mounted Equipment Locations

The mount is attached by dropping the 2 tabs and the 2 pins on the mount through the correlating slots on the main table (Figure 17).

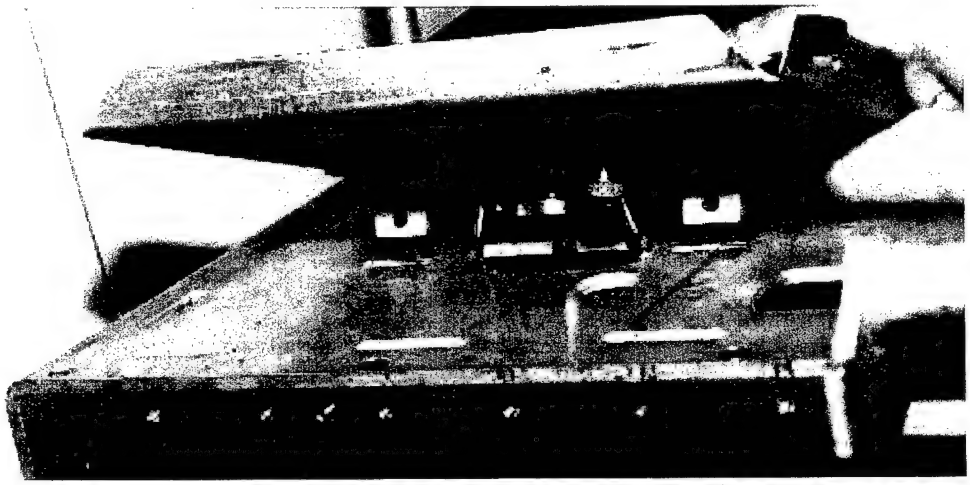


Figure 17 Directions for Top-Mounting Equipment

Note: All Top mounts have identical tabs on underside of mount. Mounts are capable of mounting front or rear facing

Once the mount is seated, use the pins to secure in place. Pins should be placed through the mount and travel completely through the correlating tabs on the underside of the main platform. Ensure safety pin is secure by trying to remove it without depressing release button on top of pin. (Figure 18).

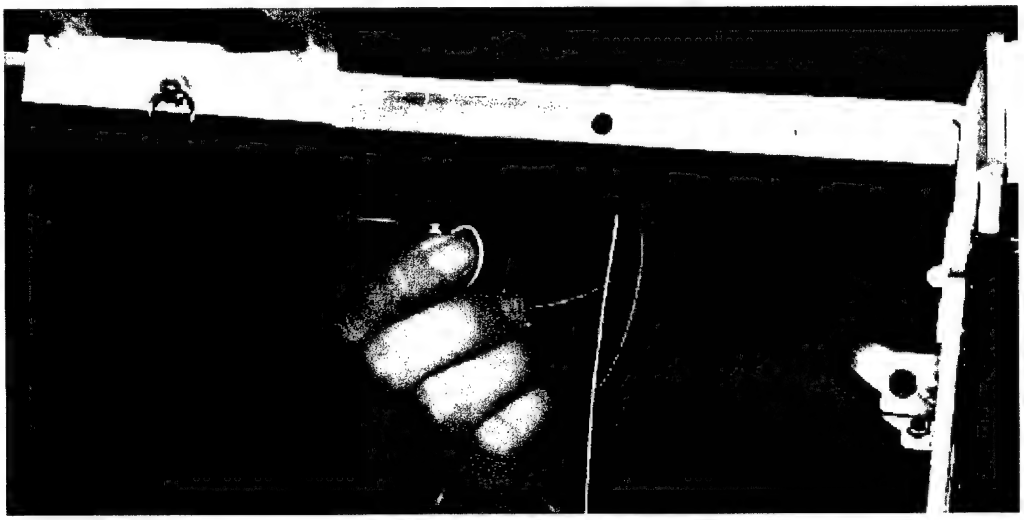


Figure 18 Securing pushpins on top mounting accessory mount

Female Bayonet Accessory Mount

The Univent Impact ventilator and suction apparatus are mounted on the top of the platform with the Female Bayonet Accessory Mount. The equipment is secured to the accessory clip using the same instructions noted for side mounting the ventilator/suction equipment. The mount used to attach the medical equipment to the main platform has a correlating grove that allows the bayonet clip to slide into. The grove is tapered and is a one-way clip. This is to ensure the mount has a snug fit and reduces the risk of the equipment dislodging. Once the mount is seated, tighten the knob on the underside of the mount to a firm grip (Figure 19).

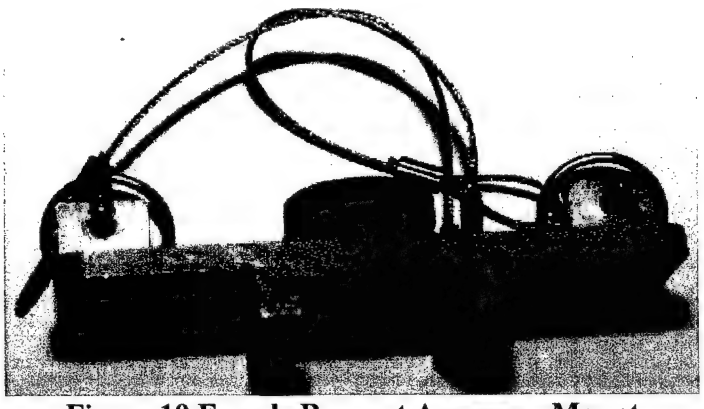


Figure 19 Female Bayonet Accessory Mount

Note: No one direction for exiting ventilator tubing is preferred. Most tubing is capable of making appropriate turns so that it can be routed towards patient's airway without occlusion.

Monitor Accessory Mount

The Protocol Encore 206EL monitor mounts on the main table only by the use of the Monitor Accessory Mount. The mount has a pan into which the monitor can be dropped. Once the monitor is seated, secure the monitor with the Velcro straps in a crisscross fashion (Figure 20).

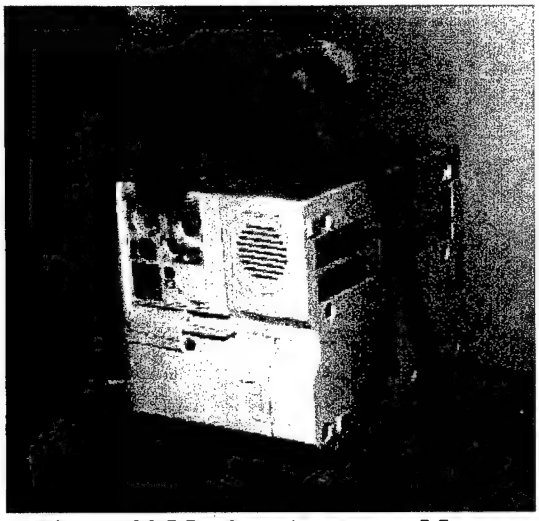


Figure 20 Monitor Accessory Mount

When properly secured, there should be no occlusion of outlets that would hinder proper operation of the monitor. The monitor is capable of rotating 360 degrees and locking in 15-degree increments. Monitor rotation is accomplished by pulling down on a Hand-Retractable Spring Plunger on the underside of the monitor accessory mount (Figure 21).

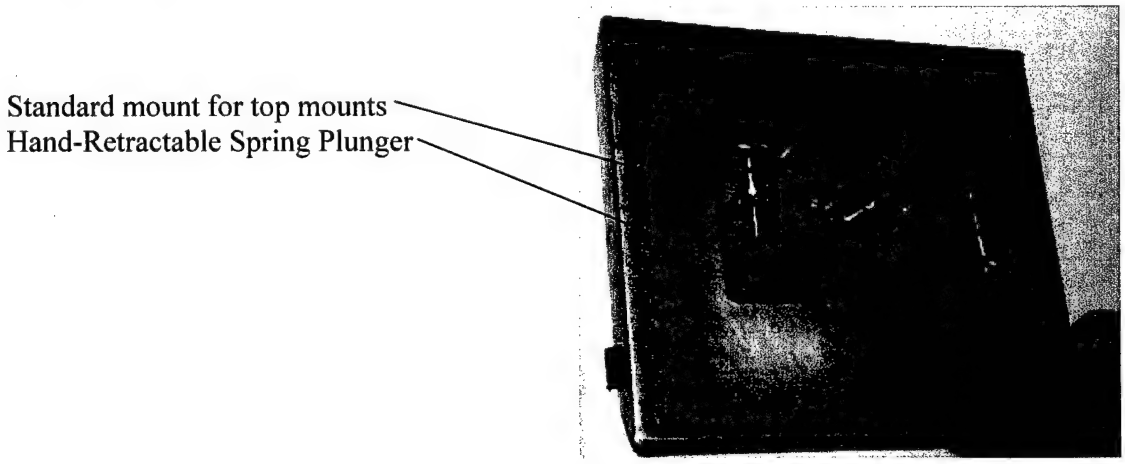


Figure 21 Monitor Accessory Mount Hand-Retractable Spring Plunger

Note: Individual equipment mounts should be placed on the main platform prior to securing medical equipment.

Note: Attempt to achieve proper monitor placement before attaching leads and cables to the monitor. Once equipment is mounted and the patient is connected to the monitor, rotation is limited by the presence of the leads and cables.

STORING THE PLATFORM

The following steps are performed when storing the platform:

a. Remove individual equipment from platform
b. Remove platform from litter
c. Turn platform upside down
d. Remove both positive locking push pins from bracing by depressing button on top of pin
e. Store oxygen cylinder clamps and intravenous pole on the inside of platform
f. Collapse bracing and allow legs to fold inward
g. Fasten Velcro straps by using the two innermost holes on the outside edge of platform
h. Secure legs with 1-inch-wide Velcro straps in a crisscross fashion ensuring that the clamping mechanism is captured
i. Store platform is a safe container for transport

FINAL REPORT OF SMEED CRITICAL CARE PLATFORM, MODEL IV

DEPARTMENT OF THE AIR FORCE
AIR FORCE RESEARCH LABORATORY (AFMC)
BROOKS AIR FORCE BASE, TEXAS

16 October 2001

MEMORANDUM FOR HQ AMC/DOVM (MSGT BOWERS, DSN: 779-3643)

FROM: 311 HSW/YAML
2504 Gillingham Drive, Suite 25
Brooks AFB, TX 78235

SUBJECT: FINAL REPORT FOR THE SMEED CRITICAL CARE PLATFORM, MODEL IV

1. The test and evaluation of the Special Medical Emergency Equipment Device (SMEED) has been completed. 311 HSW/YAML found the SMEED "Approved" for use during all phases of flight on all USAF aircraft (including fixed and rotary wing). Vibration tests were performed to Jet, Turbo-prop, and Helicopter characteristics and passed all tests successfully. The SMEED weighs twenty pounds and was tested by supporting fifty-five pounds of standard medical equipment. Additionally, in-flight feasibility testing was conducted on-board a C-130 H aircraft.

2. The following comments and recommendations apply to the SMEED:

A. When the SMEED is mounted onto a standard NATO litter and has medical equipment secured to it (such as the Propaq 206, IVAC MedSystem III, and ventilator) care must be taken when loading into and out of aircraft litter tiers. Stirrups on above litter can strike medical equipment causing accidental damage. Litter bearers should be briefed on cautions in this regard. 311 HSW/YAML recommends that the Propaq monitor display screen is positioned to face the patient during onload and offload to minimize risk of striking the screen during patient litter hand carries.

B. Litter stirrups of NATO litters placed above the mounted SMEED may impede rotation of the occupied swivel tray in some aircraft litter load configurations (C-130 centerline litter tiers and C-9A Special Care Area using all four-litter tiers. Raising the litter handle of the litter above the SMEED will allow free swiveling of medical equipment into the desired in-flight position. Litter above can then be lowered and secured. Aeromedical Evacuation crews should configure the SMEED into the desired configuration before loading the patient on-board USAF aircraft if at all possible to minimize patient loading time. Reconfiguration of the SMEED on-board aircraft is easily accomplished if needed.

C. 311 HSW/YAML recommends SMEED be modified with sticker/label indicating instruction for quick release handles. This will allow any crewmember to quickly remove SMEED from litter during a medical or aircraft emergency.

D. Recommend two people be used when securing SMEED to litter and also when securing medical equipment onto the SMEED.

E. Recommend durable securing strap to replace existing Velcro strap used for securing Propaq cardiac monitor. Although Velcro strap survived all vibration testing, it will likely wear out after repeated use.

F. Adjustment height of SMEED must be determined before placing device onto an occupied litter. Attempting to adjust loaded SMEED over litter patient will risk injury to patient. Correct sequence must be:

   a. Place patient onto litter.
   b. Select appropriate SMEED height for patient.
   c. Secure SMEED to field litter ensuring all locking pins are secured.
   d. Secure medical equipment onto SMEED.

3. The SMEED design offers maximum flexibility in securing medical equipment devices needed for patient care directly on the patient's litter. This improvement allows continuous patient monitoring, patient care and comfort, and may reduce the need for an "equipment litter". The SMEED is an important advancement in aeromedical equipment securing technology by accommodating a variety of Patient Movement Items common to all military services.

4. If you have any questions, please feel free to contact our office at DSN: 240-2937 or commercial: (210) 536-2937.

//SIGNED//

AL CABALLERO
Lead Engineer, 311 HSW/YAML

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 311TH HUMAN SYSTEMS WING (AFMC)
BROOKS AIR FORCE BASE TEXAS

29 MAR 2002

MEMORANDUM FOR ASC/GRE

FROM: 311 HSW/YA
7909 Lindbergh Drive
Brooks AFB TX 78235-5306

SUBJECT: Safe-To-Fly Recommendation for the Special Medical Emergency Equipment Device (SMEED), Model IV

1. The 311th Human Systems Program Office recommends the SMEED, Model IV equipment rack as Safe-To-Fly on all Air Force cargo aircraft. This Safe-To-Fly recommendation is based on satisfactory results from a performance baseline assessment, vibration tests, crash acceleration analysis and flight testing.

2. The background paper, Atch 1, provides a description of the airworthiness package format and contents. Please consider the test report and data, Atch 2, to make an airworthiness assessment of the subject device.

3. If you have any questions, please contact Capt Paul Driessen, Aeromedical Test Branch Chief, at DSN 240-3144, or commercial (210) 536-3144.

Vern A. Jauer

VERN A. JAUER
Deputy Program Director
Human Systems Program Office

Attachments:
1. Background Paper
2. Airworthiness Package

FLIGHT TESTING PHOTOGRAPHS

Vibration tests were performed to Jet, Turbo-prop, and Helicopter characteristics and passed all tests successfully. The SMEED weighs twenty pounds and was tested by supporting fifty-five pounds of standard medical equipment. Additionally, in-flight feasibility testing was conducted on-board a C-130 H aircraft.

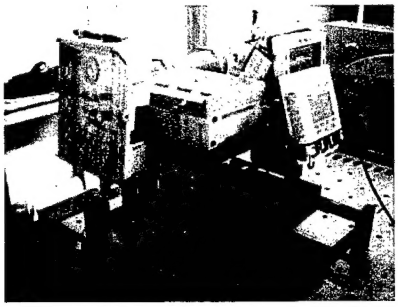


Figure 22 Y Axis

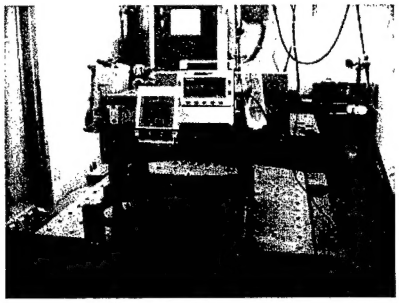


Figure 23 Z Axis

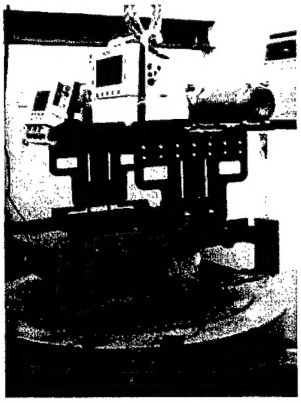


Figure 24 X Axis

PRIOR VERSIONS OF THE SMEED CRITICAL CARE PLATFORM

3rd Version of SMEED Platform in middle height position in HH-60L Black hawk

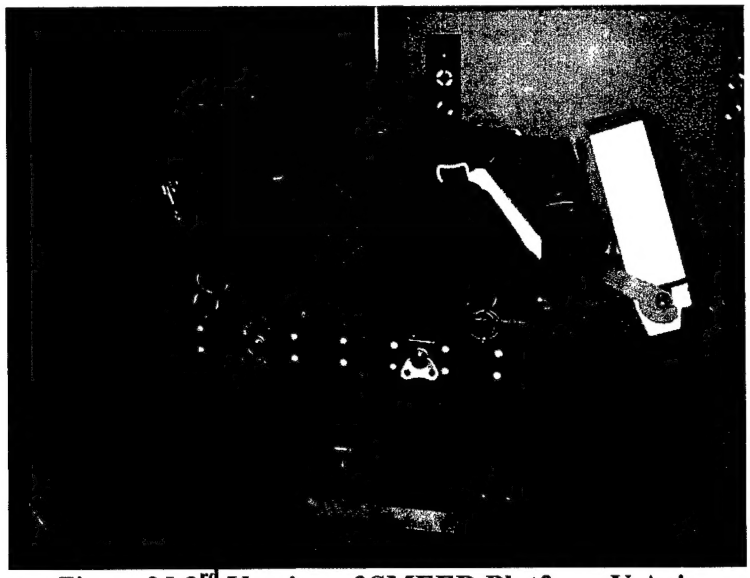


Figure 25 **3rd Version of SMEED Platform Y Axis**

NOTE: The notable difference between the 3rd version and the fourth version is the single draw latch in the center and the 4 draw latches on each corner. 4th version became more rigid after going to a 2 draw latch system with inside bracing; resulting in the no longer necessary 4 draw latch on each corner.

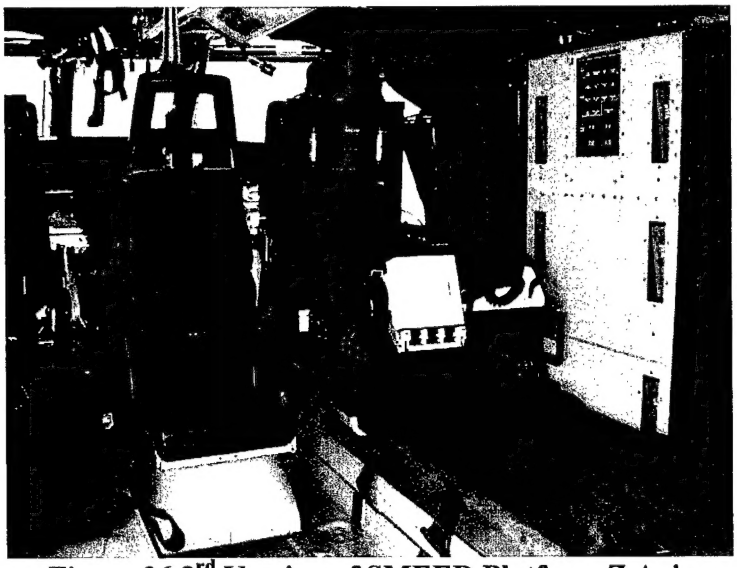


Figure 26 3rd Version of SMEED Platform Z Axis

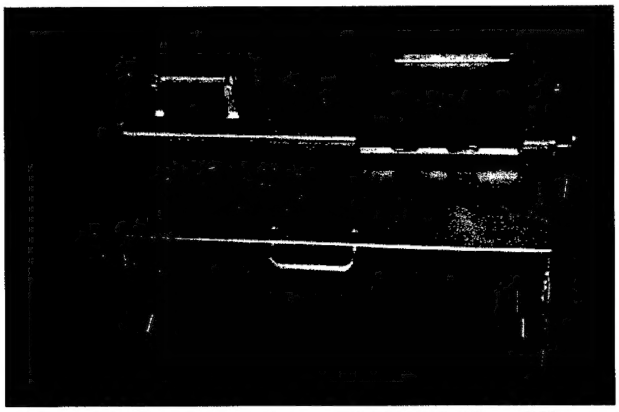


Figure 27 1st Version of SMEED Top View

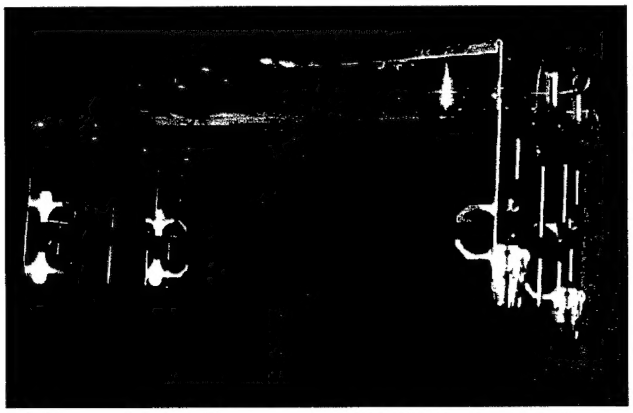


Figure 28 1st Version of SMEED Front View

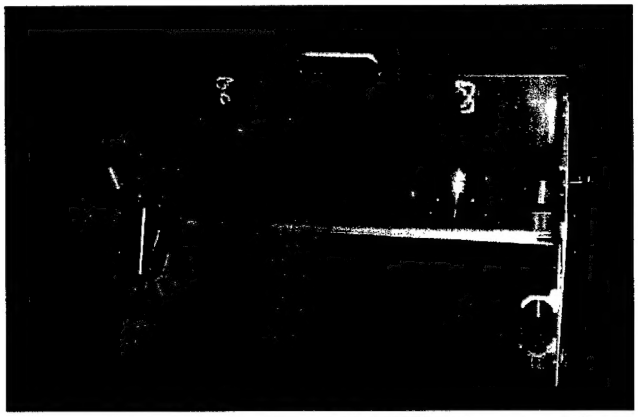


Figure 29 1st Version of SMEED Bottom View

SMEED CAPABLE OF ATTACHING TO A STOKES LITTER
SMEED STOKES VERSION 1

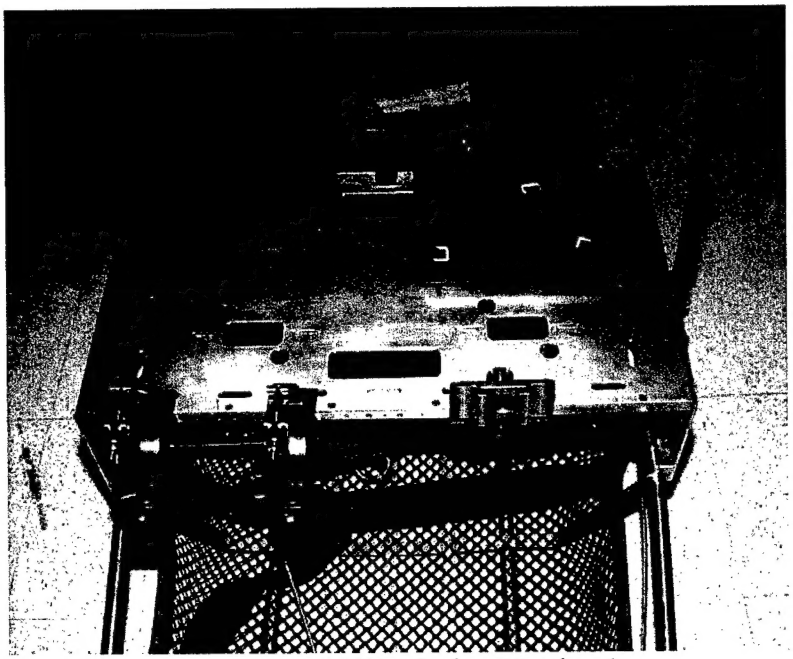


Figure 30 SMEED Stokes Version 1

A new version of the SMEED platform has been designed that can be attached on a Stokes Litter and has the same capabilities as the SMEED Platform Mark IV, with the exception of height adjustment at this time.

Technical Data and Capabilities

Technical Data
Composition: Aluminum sheet and stainless steel parts
Color: anodized flat black
Weight (empty): 14 lbs.
Dimensions:
- Length: 20 inches
- Width: 25 inches
- Height: 7 inches

Mounts on the Stokes litter (middle)
Accommodates any reasonable medical equipment load